

# FINAL REPORT

## Comparison of Odor Masking Effects of Western Juniper, Western Redcedar, and Pine Horse Bedding

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### Introduction

The purpose of this project was to determine the possible odor masking effects of western juniper (*Juniperus occidentalis*), when used as bedding material in horse stalls. For purposes of comparison, western redcedar (*Thuja plicata*), and pine (*Pinus* sp.) were used in the study as well. The study was conducted at the OSU Equine Center in Corvallis, OR.

### Raw Materials and Storage

The western juniper used in this project was processed in Klamath Falls from green juniper logs from the Randall restoration project, October 1998 cutting. The cordwood was processed through the shaver (unscreened) and packaged loose in a 3 ft x 4 ft compost bin with a plastic liner. The shavings varied from sawdust size to 1 x 1.5 inch flakes. The moisture content was approximately 50% OD.

Both the western redcedar and the pine were commercially available bedding material. The western redcedar was packaged in 10 cubic foot compressed bales in Woodburn, OR. The pine was packaged in 10 cubic foot compressed bales in B.C. Canada. All bedding materials were delivered in a covered van and kept in covered storage at the OSU Horse Center.

### Methods

Three adjacent stalls, each 11 x 14 ft. in size, were used for each bedding type. Bedding material was placed in the stalls to approximately 1 inch deep. Each day the stalls were cleaned by raking the soiled bedding out, and replacing the removed material with fresh bedding material. After 1 week, all the bedding was removed from each stall. Each set of 3 stalls were then made up with a different type of bedding material, to provide some standardization for variability among horses. During the second week, soiled bedding was raked out each day and replaced with fresh-bedding material as done previously.

A trained panel consisting of 8 people was used to evaluate the sensory aspects of each type of bedding material. During each week, the sensory aspect of the bedding in the stalls was evaluated on days 1, 4, and 7. Panelists evaluated the sensory aspects of the stalls at approximately 3:30 p.m. on the testing days, with the horses removed just prior to evaluation.

Panelists evaluated both the intensity of overall bedding aroma, as well as intensity of urine aroma in each stall. Aromas were evaluated using a 7-point scale, ranging from 0 (none) to 6 (extreme).

## Results

Due to a mis-communication, the stalls were not set up with their appropriate bedding types until after noon on the first day of the study, only a few hours before the panelists arrived. The ratings for the first day of the first week were therefore eliminated from final analysis.

The mean intensity for overall bedding aroma for pine, cedar, and juniper, respectively, was 2.43, 3.35, and 3.63 (refer to Table 1). Mean intensity was calculated as an average of bedding aroma numbers from all panelists from each testing day. An analysis of variance (ANOVA) demonstrated a significant difference among bedding types ( $\alpha = 0.5$ ,  $p = 1.17 \times 10^{-31}$ ). A student's paired T-test was performed to determine if there was a significant difference between sample types. The t-test showed a significant difference between all three possible pairs (pine vs. cedar, pine vs. juniper, and cedar vs. juniper), indicating that juniper had a significantly higher overall aroma when used as a horse bedding material.

The mean intensity for urine aroma for pine, cedar, and juniper, respectively, was 2.65, 1.78, and 1.71 (refer to Table 1). Mean intensity was calculated as an average of urine aroma numbers from all panelists from each testing day. An analysis of variance (ANOVA) demonstrated a significant difference among the bedding types ( $\alpha = 0.5$ ,  $p = 6.71 \times 10^{-14}$ ). A student's paired T-test was performed to determine if there was a significant difference between sample types. The t-test showed that cedar and juniper had the same ability to mask horse urine odors, in this particular study, and both were more effective at masking the horse urine odors than the pine bedding material.

Table 1. Mean\* ratings of bedding materials by a sensory panel

Aroma	Pine	Cedar	Juniper
Bedding	2.43 <sup>a</sup>	3.35 <sup>b</sup>	3.63 <sup>c</sup>
Urine	2.65 <sup>b</sup>	1.78 <sup>a</sup>	1.71 <sup>a</sup>

\*scale values: none = 0 to 6 = extreme

abc: means with same superscript letter are not significantly different at  $p=0.05$

## References

ASTM E18 1998, Sensory Testing Methods. Second Edition. E. Chambers and M. Baker (Eds).

Meilgaard, Civille-Carr. 1996. Sensory Evaluation Techniques. CRC Press.